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EXAMINER
LU, KUEN S

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/965,393	MCCANN ET AL.
	Examiner	Art Unit
	Kuen S Lu	2177

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>27 September 2001</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-42</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-42</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

    a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1)☒ Notice of References Cited (PTO-892) 4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5)☐ Notice of Informal Patent Application (PTO-152)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . 6)☐ Other:

DETAILED ACTION

Specification

1. Claim 17 is objected to because of the following informalities:

The phrase "method of claim 5" seems to have a typo. The Examiner suggested

"method of claim 16". This Office Action is written based on the Claim 17's

dependency on Claim 16. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form

the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3-6, 8-9 and 16-19 are rejected under 35 U.S.C. 102(e) as

anticipated by Massiglia (VERITAS Volume Replication and Oracle Databases, a

Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000).

As per Claims 1, Massiglia teaches the following:

"storing a file systems write data operation in a first temporary data store" at Fig. 4,

Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication

scheme; and

"mirroring the file systems write data operation in a second temporary data store" at Fig.

3, Page 18, lines 5-15, by sending data to secondary sites and write data to log at the

secondary sites in a synchronous replication scheme; and

"deleting the mirrored file systems write data operation from the second temporary data store in the case when the file systems write data operation is successfully written from the first temporary data store to the storage medium" at Fig. 4, Page 18, lines 5-15, by confirming receipt of data and writing data to the first site and at Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by structuring the log as a circular buffer for being over-written in cycle.

As per Claim 3, Massiglia further teaches "determining if the file systems write data operation is successfully written from the first temporary data store" at Fig. 4, Page 18, lines 5-15, by continuing data replication steps of sending data to the secondary sites and writing data to the primary site after the step of writing data to primary site log.

As per Claim 4, Massiglia teaches "mirroring is performed one of concurrent with, during, or following said storing of the file systems write data operation in the first temporary data store" at Fig. 4, Page 18, lines 5-15 and Page 17 by writing the primary and secondary sites following writing the primary site log.

As per Claim 5, Massiglia teaches "sending a signal back to a source of the file system write data operation when it is determined that the file systems write data operation is successfully stored in the first and second temporary data stores" at Fig. 4, Page 18, lines 5-15 and Page 17 by confirming write to the primary and secondary sites after the steps of writing logs at the primary and secondary sites.

As per Claim 6, Massiglia teaches volume replication in database applications, including "storing a file systems write data operation in a first temporary data store of the one of the plurality of servers" at Fig. 4, Page 18, lines 5-15, by writing data to the

primary site log in a synchronous replication scheme; "mirroring the file systems write

data operation in a second temporary data store of said one of the plurality of servers"

at Fig. 3, Page 18, lines 5-15, by sending data to secondary sites and write data to log

at the secondary sites in a synchronous replication scheme; and "deleting the mirrored

file systems write data operation from the second temporary data store in the case

when the file systems write data operation is successfully written from the first

temporary data store of said one of the plurality of servers to the storage medium" at

Fig. 4, Page 18, lines 5-15, by confirming receipt of data and writing data to the first site

and at Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by

structuring the log as a circular buffer for being over-written in cycle.

As per Claim 8, Massiglia teaches "determining if the file systems write data

operation is successfully written from the first temporary data store of said one of the

plurality of servers" at Fig. 4, Page 18, lines 5-15, by continuing data replication steps of

sending data to the secondary sites and writing data to the primary site after the step of

writing data to primary site log.

As per Claim 9, Massiglia teaches "mirroring is performed one of concurrent with,

during or following said storing of the file systems write data operation in the first

temporary data store of said one of the plurality of servers" at Fig. 4, Page 18, lines 5-15

and Page 17 by writing the primary and secondary sites following writing the primary

site log.

As per Claim 16, Massiglia teaches the following volume replication in database

applications under an environment of a plurality of servers:

"storing a file systems write data operation in a first temporary data store" at Fig. 4,

Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication

scheme; "mirroring the file systems write data operation in a second temporary data

store" at Fig. 3, Page 18, lines 5-15, by sending data to secondary sites and write data

to log at the secondary sites in a synchronous replication scheme; and "deleting the

mirrored file systems write data operation from the second temporary data store in the

case when the file systems write data operation is successfully written from the first

temporary data store to the storage medium" at Fig. 4, Page 18, lines 5-15, by

confirming receipt of data and writing data to the first site and at Page 19, Paragraph

"Storage Replication Log Overview" on deleting the log by structuring the log as a

circular buffer for being over-written in cycle.

As per Claim 17, Massiglia teaches "determining if the file systems write data

operation is successfully written to the storage medium from the first temporary data

store of said one of the plurality of servers" at Fig. 4, Page 18, lines 5-15, by continuing

data replication steps of sending data to the secondary sites and writing data to the

primary site after the step of writing data to primary site log.

As per Claim 18, Massiglia teaches "mirroring is performed one of concurrent with,

during, or following said storing of the file systems write data operation in the first

temporary data store of said one of the plurality of servers" at Fig. 4, Page 18, lines 5-15

and Page 17 by writing the primary and secondary sites following writing the primary

site log.

As per Claims 19, Massiglia teaches "sending a signal back to a source of the file

system write data operation when it is determined that the file systems write data

operation is successfully stored in the first temporary data store of said one of the

plurality of servers and the mirrored file systems write data operation is stored in the

second temporary data store of said another of said plurality of servers" at Fig. 4, Page

18, lines 5-15 and Page 17 by confirming write to the primary and secondary sites after

the steps of writing logs at the primary and secondary sites.

3.   Claims 21-23 and 29 are rejected under 35 U.S.C. 102(e) as anticipated by Sunclus

(Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001, hereafter "Sunclus").

As per Claims 21, Sunclus teaches the following:

"a storage medium" at Figure 2-1 by showing the multi-host and local disks;

"a plurality of servers servicing the storage medium, each server including a first

temporary data store and a second temporary data store" at Figures 2-1 and 3-1 by

showing the nodes and server-storage connected on the networks, and temporary store

configured on the local disks (globally devices); and

"a communications link, the communications link being configured and arranged so as

to communicatively interconnect the first temporary data store of one of the plurality of

servers to the second temporary data store of another of the plurality of servers and to

communicatively interconnect the first temporary data store of said another of the

plurality of servers to the second temporary data store of said one of the plurality of

servers" at Figures 2-1 and 3-1 by showing the components on various inter-connects.

As per Claim 22, Sunclus teaches "communications link comprises a first and second communications interconnection, the first communications interconnection being configured and arranged so as to communicatively interconnect the first temporary data store of one of the plurality of servers to the second temporary data store of another of the plurality of servers and the second communications interconnection being configured and arranged to communicatively interconnect the first temporary data store of said another of the plurality of servers to the second temporary data store of said one of the plurality of servers" at Figures 2-1 and 3-1 by showing the nodes and server-storage connected on the networks, and temporary storage configured on the local disks (globally devices).

As per Claim 23, Sunclus teaches "first and second communications interconnects are each one of a fiber optical channel, a gigabit Ethernet and an infiniband" at Pages 43 and 46 by using various transport cables and junctions, including fiber optical, giga Ethernet, among others, depending on cluster configuration.

As per Claim 29, Sunclus teaches "file systems write data operations are sourced from one or more client computers of a computer network" at Pages 20 and 33 by showing the cluster and storage interconnected cluster;

"each of the plurality of servers includes a device that operably interconnects each of the plurality of servers to the computer network" at Pages 20 and 33 by showing the cluster and storage interconnected cluster; and

"said program for execution on the central processing unit further includes instructions and criteria for receiving and processing each file systems write data operation being

sourced from any one of the one or more client computers" at Pages 20 and 33 by

showing the cluster nodes, global and local storage volumes interconnected cluster.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 2, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Massiglia (VERITAS Volume Replication and Oracle Databases, a Solution White

Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000), as applied to Claims 1,

3-6 and 8-9 and in view of Sundar (Sun StorEdge™ Network Data Replicator 3.0

System Administrator Guide, Sun Microsystems™, June, 2001, hereafter "Sundar").

As per Claim 2, Massiglia teaches writing file systems writing operation to the

mirrored logs and disks on the primary and secondary sites.

Massiglia does not specifically teach the writing data from the secondary to the

primary in the case "when the file systems write data operation is not successfully

written from the first temporary data store".

However, Sundar teaches a reverse update re-synchronization from the secondary

system to the primary by retrieving the scoreboard from the secondary sites and

refreshing it to the primary volume at Page 84, items 1-4.

It would have been obvious to one having ordinary skill in the art at the time of the

applicant's invention was made to combine Sundar's reference with Massiglia's by reversing the update resynchronization process because by doing so the business continuance plan would be fully protected by the redundant storage of critical information across physically separate sites.

As per Claim 7, Sundar further teaches "writing includes writing the mirrored file systems write data operation from the second temporary data store of said another of the plurality of the servers to the storage medium in the case when the file systems write data operation is not successfully written from the first temporary data store of said one of the plurality of servers" by a reverse update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume.

As per Claim 10, Sundar further teaches the following:
"one of the plurality of servers is not operational" or that an operating system of said one of the plurality of servers is not operational" or "operating system I/O of said one of the plurality of servers is not operational" at Pages 75-76 by using Sun StorEdge™ Network Data Replicator software to keep a scoreboard for each storage volume for indicating changes from last known image synchronized with the primary host.

Sundar further teaches "writing the mirrored file systems write data operation from the second temporary data store to the storage medium when it is determined that file systems write data operation is not successfully written from the first temporary data store to the storage medium" by reversinh update re-synchronization from the

secondary system to the primary by retrieving the scoreboard from the secondary sites

and refreshing it to the primary volume at Page 84, items 1-4.

5.   Claims 11-15, 31 and 33 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Massiglia (VERITAS Volume Replication and Oracle Databases, a

Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000 and in view

of Sundar (Sun StorEdge™ Network Data Replicator 3.0 System Administrator Guide,

Sun Microsystems™, June, 2001, hereafter "Sundar").

As per Claim 11, Massiglia teaches the following:

"storing a file systems write data operation in a first temporary data store" at Fig. 4,

Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication

scheme;

"mirroring the file systems write data operation stored in a second temporary data store"

at Fig. 3, Page 18, lines 5-15, by sending data to secondary sites and write data to log

at the secondary sites in a synchronous replication scheme; and

"deleting the mirrored file systems write data operation from the second temporary

data store when it is determined that the file systems write data operation is

successfully written from the first temporary data store to the storage medium" at Fig. 4,

Page 18, lines 5-15, by confirming receipt of data and writing data to the first site and at

Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by

structuring the log as a circular buffer for being over-written in cycle.

Though Massiglia teaches writing file systems writing operation to the mirrored logs

and disks on the primary and secondary sites.

Massiglia does not specifically teach the writing data from the secondary to the

primary in the case "when the file systems write data operation is not successfully

written from the first temporary data store".

However, Sundar teaches a reverse update re-synchronization from the secondary

system to the primary by retrieving the scoreboard from the secondary sites and

refreshing it to the primary volume at Page 84, items 1-4.

It would have been obvious to one having ordinary skill in the art at the time of the

applicant's invention was made to combine Sundar's reference with Massiglia's by

reversing the update resynchronization process because by doing so the business

continuance plan would be fully protected by the redundant storage of critical

information across physically separate sites.

As per Claim 12, Massiglia teaches "mirroring is performed one of concurrent with,

during, or following said storing of the file systems write data operation in the first

temporary data store" at Fig. 4, Page 18, lines 5-15 and Page 17 by writing the primary

and secondary sites following writing the primary site log.

As per Claim 13, Massiglia teaches "sending a signal back to a source of the file

system write data operation when it is determined that the file systems write data

operation is successfully stored in the first and second temporary data stores" at Fig. 4,

Page 18, lines 5-15 and Page 17 by confirming write to the primary and secondary sites

after the steps of writing logs at the primary and secondary sites.

As per Claim 14, Massiglia teaches volume replication in database applications,

including "storing a file systems write data operation in a first temporary data store" at

Fig. 4, Page 18, lines 5-15, by writing data to the primary site log in a synchronous

replication scheme; "mirroring the file systems write data operation in a second

temporary data store" at Fig. 3, Page 18, lines 5-15, by sending data to secondary sites

and write data to log at the secondary sites in a synchronous replication scheme; and

"deleting the mirrored file systems write data operation from the second temporary data

store in the case when the file systems write data operation is successfully written from

the first temporary data store to the storage medium" at Fig. 4, Page 18, lines 5-15, by

confirming receipt of data and writing data to the first site and at Page 19, Paragraph

"Storage Replication Log Overview" on deleting the log by structuring the log as a

circular buffer for being over-written in cycle.

As per Claim 15, Sundar further teaches writing the mirrored file systems write data

operation from the second temporary data store of said another of the plurality of

servers to the storage medium is done in the case when at least one of:

"one of the plurality of servers is not operational" or that an operating system of said one

of the plurality of servers is not operational" or "operating system I/O of said one of the

plurality of servers is not operational" at Pages 75-76 by using Sun StorEdge™ Network

Data Replicator software to keep a scoreboard for each storage volume for indicating

changes from last known image synchronized with the primary host.

As per Claim 31, Massiglia teaches volume replication in database applications

under a plurality of servers for the following:

"storing a file systems write data operation in a first temporary data store" at Fig. 4,

Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication

scheme; "mirroring the file systems write data operation in a second temporary data store" at Fig. 3, Page 18, lines 5-15, by sending data to secondary sites and write data to log at the secondary sites in a synchronous replication scheme; and "deleting the mirrored file systems write data operation from the second temporary data store in the case when the file systems write data operation is successfully written from the first temporary data store to the storage medium" at Fig. 4, Page 18, lines 5-15, by confirming receipt of data and writing data to the first site and at Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by structuring the log as a circular buffer for being over-written in cycle.

Though Massiglia teaches writing file systems writing operation to the mirrored logs and disks on the primary and secondary sites.

Massiglia does not specifically teach the writing data from the secondary to the primary in the case "when the file systems write data operation is not successfully written from the first temporary data store".
circular buffer for being over-written in cycle.

However, Sundar teaches a reverse update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Sundar's reference with Massiglia's reference by implementing data recovery from the temporary storage on other node(s) in a cluster environment because by doing so the all data operations of an enterprise in

a distributed environment would be fully protected from any environmental disasters and the continuance of business would be safeguarded.

As per Claim 33, Massiglia teaches "a plurality of mirrored file systems write data operations are stored in the second temporary data store of said another of the servers of the cluster and wherein said writing includes writing all of the plurality of mirrored file systems write data operations" at Fig. 4, Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication scheme.

6.   Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Massiglia (VERITAS Volume Replication and Oracle Databases, a Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000), as applied to Claims 16-19, and in view of Sunclus (Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001, hereafter "Sunclus").

As per Claim 20, Massiglia teaches writing the mirrored file system write operation.

Massiglia does not specifically teaches to get writing the mirrored file system write operation done under server's un-operational status.

However, Sundar teaches "one of the plurality of servers is not operational" or that an operating system of said one of the plurality of servers is not operational" or "operating system I/O of said one of the plurality of servers is not operational" at Figures 2-1 and 3-1 by showing the architecture of a cluster system, including nodes and server-storage connected on the networks, and temporary storage configured on the local disks (globally devices).

It would have been obvious to one having ordinary skill in the art at the time of the

applicant's invention was made to combine Massiglia's reference with Sundar's by implementing a clustering system for the file system because file writing would continue during abnormal server operational status because network cluster is a high availability system.

7.   Claims 24-28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sunclus (Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001, hereafter "Sunclus"), as applied to Claims 21-23 and 29, and further in view of Massiglia (VERITAS Volume Replication and Oracle Databases, a Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000).

As per Claim 24, Sunclus teaches a system of a plurality of servers, storage medium and communication link for writing file system.

Sundar does not specifically teach storing or copying file system write operation.

However, Massiglia teaches "storing a file systems write data operation in the first temporary data store of said one of the plurality of servers" at Fig. 4, Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication scheme.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Massiglia's reference with Sunclus' by installing the file system writing software on the network hardware system as taught by Sunclus such that the combined system would be able to perform volume management function in a multiple nodes environment.

Massiglia further teaches "communicating a copy of the file systems write data operation being stored in the first temporary data store of said one of the plurality of

servers via the communications link to the second temporary data store of said another of the plurality of servers for storage of the copy therein" at Fig. 4, Page 18, lines 5-15, by writing data to the logs of the primary and secondary sites in a cluster environment.

As per Claim 25, Sundar teaches "writing the copy of the file systems write data operation from the second temporary data store of said another of the plurality of the servers to the storage medium in the case when the file systems write data operation is not successfully written from the first temporary data store of said one of the plurality of servers" by reversing the update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume at Page 84, items 1-4 in a cluster environment.

Massiglia further teaches "deleting the copy of the file systems write data operation from the second temporary data store of said another of the plurality of servers in the case when the file systems write data operation is successfully written from the first temporary data store of said one of the plurality of servers to the storage medium" at at Fig. 4, Page 18, lines 5-15, by confirming receipt of data and writing data to the first site and at Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by structuring the log as a circular buffer for being over-written in cycle in the cluster environment.

As per Claim 26, Massiglia further teaches "program for execution on the central processing unit further includes instructions and criteria so that said communicating is performed one of concurrent with, during, or following said storing of the file systems write data operation to the first temporary data store of said one of the plurality of

servers" at Fig. 4, Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication scheme.

As per Claim 27, Massiglia further teaches "sending a signal back to a source of the file system write data operation when it is determined that the file systems write data operation is successfully stored in the first temporary data store of said one of the plurality of servers and the mirrored file systems write data operation is stored in the second temporary data store of said another of said plurality of servers" at Fig. 4, Page 18, lines 5-15 and Page 17 by confirming write to the primary and secondary sites after the steps of writing logs at the primary and secondary sites.

As per Claim 28, Sundar further teaches writing the mirrored file systems write data operation from the second temporary data store of said another of the plurality of servers to the storage medium is done in the case when at least one of: "one of the plurality of servers is not operational" or that an operating system of said one of the plurality of servers is not operational" or "operating system I/O of said one of the plurality of servers is not operational" at Pages 75-76 by using Sun StorEdge™ Network Data Replicator software to keep a scoreboard for each storage volume for indicating changes from last known image synchronized with the primary host.

As per Claim 30, Massiglia further teaches "sending a signal back to said one of the one or more client computers sourcing a given file system write data operation when it is determined that the given file systems write data operation is successfully stored in the first temporary data store of said one of the plurality of servers and the copy of the given file systems write data operation is stored in the second temporary data store of

said another of said plurality of servers" at Fig. 4, Page 18, lines 5-15 and Page 17 by confirming write to the primary and secondary sites after the steps of writing logs at the primary and secondary sites.

8.   Claim 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Massiglia (VERITAS Volume Replication and Oracle Databases, a Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000) and in view of Sundar (Sun StorEdge™ Network Data Replicator 3.0 System Administrator Guide, Sun Microsystems™, June, 2001, hereafter "Sundar"), as applied to Claims 31 an d 33, and further in view of Sunclus (Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001, hereafter "Sunclus").

As per Claim 32, Massiglia teaches "writing of mirrored file systems write data operation from the second temporary data store of said another of the servers of the cluster to the storage medium" at Fig. 4, Page 18, lines 5-15, by using replication technique to write logs and disks at the primary and secondary sites.

Massiglia does not teach "when it is determined from said monitoring that said one of the clusters of the server is not operational" for writing files system from the temporary storage at the secondary sites.

However, Sundar teaches write data operation from the second temporary data store of said another of the servers by using a reverse update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume at Page 84, items 1-4.

It would have been obvious to one having ordinary skill in the art at the time of the

applicant's invention was made to combine Sundar's reference with Massiglia's by including the reverse update of writing file systems writing operation when the primary site writing does not write through successfully because by doing so the replication would complete successfully under the abnormal situation.

However, neither Massiglia nor Sundar teaches monitoring the operational status of servers under the clustering environment during the writing file system writing operation.

On the other hand, Sunclus teaches monitoring an operational status of each of the servers of the cluster" at Page 12, last two lines by using cluster monitors to monitor clustering services and resources.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Sundar's reference with Massiglia-Sunclus' by including cluster resource monitoring as a feature of the distributed system because by doing so would guarantee the successful failing over in case of failures.

9.   Claims 34-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Massiglia (VERITAS Volume Replication and Oracle Databases, a Solution White Paper, by Paul Massiglia, VERITAS Software Co., 5/29/2000) and in view of Sundar (Sun StorEdge™ Network Data Replicator 3.0 System Administrator Guide, Sun Microsystems™, June, 2001, hereafter "Sundar"), and further in view of Sunclus (Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001, hereafter "Sunclus").

As per Claim 34, Massiglia teaches "storing the file systems write data operation in the first temporary data store of one server" at Fig. 4, Page 18, lines 5-15, by writing data to the primary site log in a synchronous replication scheme;

"mirroring the file systems write data operation being stored in the first temporary data store of said one server in the second temporary data store of another server" at Fig. 4, Page 18, lines 5-15, by sending data to secondary sites and write data to log at the secondary sites in a synchronous replication scheme.

Though Massiglia teaches "writing the mirrored file systems write data operation".

Massiglia does not specifically teach the writing operation from the second temporary data store of said another server to the storage medium in the case when said monitoring determines that said one server is not operational.

However, Sundar teaches reversing the update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume at Page 84, items 1-4 in a cluster environment.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Sundar's reference with Massiglia's by reversing the update resynchronization process because by doing so the business continuance plan would be fully protected by the redundant storage of critical information across physically separate sites.

Neither Massiglia nor Sundar teaches "monitoring an operational status of each of the servers of the cluster" at Page 12, last two lines by using cluster monitors to monitor clustering services and resources".

On the other hand, however, Sunclus teaches monitoring an operational status of each of the servers of the cluster" at Page 12, last two lines by using cluster monitors to monitor clustering services and resources.

It would have been obvious to one having ordinary skill in the art at the time of the

applicant's invention was made to combine Sundar's reference with Massiglia-Sunclus'

by including cluster resource monitoring as a feature of the distributed system because

by doing so would guarantee the successful failing over in case of failures.

As per Claim 35, Massiglia teaches "a plurality of mirrored file systems write data

operations are stored in the second temporary data store and wherein said writing

includes writing all of the plurality of mirrored file systems write data operations from the

second temporary data store" at Fig. 4, Page 18, lines 5-15, by writing data to the

primary and second site logs and the primary and secondary sites disks in a

synchronous or asynchronous replication schemes.

As per Claim 36, Massiglia teaches "writing of all of the plurality of mirrored file

system write data operations are completed before accepting any new file system write

data operations for writing to the storage medium" at Fig. 4, Page 18, lines 5-15, by

writing data to logs or disks in a synchronous fashion.

As per Claim 37, Massiglia teaches "stopping said mirroring of file systems write

data operations in the case when said one server is not operational" and "restarting said

mirroring of file systems write data operations in the case when said one server is

returned to operation" at Fig. 4, Page 18, lines 5-15, by signaling completion of

replication for applications to continue in a synchronous fashion.

As per Claim 38, Massiglia teaches "deleting the copy of the given file systems write

data operation from the second temporary data store when it is determined that the

given file systems write data operation stored in the first temporary data store is

successfully written to the storage medium" at Fig. 4, Page 18, lines 5-15, by confirming receipt of data and writing data to the first site and at Page 19, Paragraph "Storage Replication Log Overview" on deleting the log by structuring the log as a circular buffer for being over-written in cycle.

Massiglia does not teach "writing the copy of the given file systems write data operation in the second temporary data store to the storage medium when it is determined that the given file systems write data operation was not successfully written to the storage medium from the first temporary data store".

However, Sundar teaches reversing the update re-synchronization from the secondary system to the primary by retrieving the scoreboard from the secondary sites and refreshing it to the primary volume at Page 84, items 1-4 in a cluster environment.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Sundar's reference with Massiglia's by reversing the update resynchronization process because by doing so the business continuance plan would be fully protected by the redundant storage of critical information across physically separate sites.

Neither Massiglia nor Sundar teaches "storing a given file systems write data operation in the first temporary data store of one of the plurality of servers, the server having ownership over that portion of the storage medium the given file systems write data operation is to be written to".

On the other hand, however, Sunclus teaches "storing a given file systems write data operation in the first temporary data store of one of the plurality of servers, the

server having ownership over that portion of the storage medium the given file systems write data operation is to be written to" at Figure 3-1 on Page 33 by cluster nodes writing to global volumes with ownership.

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention was made to combine Sunclus' reference with Sundar-Massiglia's combined teaching by integrating network clustering and volume management system because by doing so an integrated high availability file server system would have been established..

Sunclus further teaches "copying the given file systems write data operation being stored in the first temporary data store in the second temporary data store of the other of the plurality of servers, the server that does not have ownership over that portion of the storage medium the given file systems write data operation is to be written to" at Figure 3-1 on Page 33 by cluster nodes writing to global volumes with globally writable attributes.

As per Claim 39, Sunclus further teaches "monitoring the operational status of each of the plurality of servers" at Page 12, last two lines by using cluster monitors to monitor clustering services and resources".

Sunclus further teaches "determining which server is inoperable and a particular portion of the storage medium the inoperable server has ownership over" and "assigning ownership of the particular portion of the storage medium to the operational server", "causing the writing of the copy of the given file systems write data operation from the second temporary data store of the operational server to the particular portion

of the storage medium" at Page 15 by using specialized cluster software to set up and

administer the disks.

As per Claim 40, Sunclus further teaches "a plurality of given file systems write data

operations are stored in the second temporary data store and wherein said writing

includes writing all of the plurality of given file systems write data operations from the

second temporary data store" at Page 15 and Figure 3-1 on Page 33 by using special

volume management software to set up and administer the disks.

As per Claim 41, Massiglia teaches "writing of all of the plurality of mirrored file system

write data operations is accomplished before accepting any new file system write data

operations for writing to the storage medium" at Fig. 4, Page 18, lines 5-15, by writing

data to logs or disks in a synchronous fashion.

As per Claim 42, Sunclus further teaches "stopping said mirroring of file systems

write data operations when an there is an inoperable server" and "restarting said

mirroring of file systems write data operations when the inoperable server is returned to

operation" at Page 15 by using specialized cluster and volume management software

that enables setting up and administering disks and all nodes to access all storage

devices.

Conclusions

10.   The prior art made of record

  U. VERITAS Volume Replication and Oracle Databases, a Solution

   White Paper, by Paul Massiglia, VERITAS™ Software Co., 5/2000.

  V. Sun Cluster 3.0 U1 Concepts, Sun Microsystems™, July, 2001.

W. Sun StorEdge™ Network Data Replicator 3.0 System Administrator

Guide, Sun Microsystems™, June, 2001.

The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.   A. U.S. Patent   6,397,348

                    B. U.S. Patent   6,675,180

                    C. U.S. Patent   5,790,773

                    D. U.S. Patent   5,546,558

                    E. U.S. Patent   5,832,522

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Kuen S Lu whose telephone number is 703-305-4894.

The examiner can normally be reached on 8 AM to 5 PM, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John Breene can be reached on 703-305-9790. The fax phone number for

the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 703-305-3900.

KL

Patent Examiner

January 28, 2004

JOHN BREENE
SUPERVISORY PATENT EXAMINER
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